NEW YORK HEART ASSOCIATION

ABSTRACTS OF PAPERS

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Reactivity of the Systemic and Renal Arterioles to L-Norepinephrine In Essential Hypertension (Abstract)

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Evidence has been collected by others suggesting that constriction of the systemic arterioles is more susceptible to norepinephrine in hypertensive patients than in normotensive subjects.

We undertook to reexamine this problem and studied the effect of infusion of L-norepinephrine in graduated doses in 4 normotensive subjects and 17 hypertensive patients. Observations were made on systemic arterial pressure and on glomerular filtration rate and renal plasma flow. Infusion of L-norepinephrine increased mean arterial pressure in a comparable manner in normotensive and hypertensive individuals. Effect on glomerular filtration rate showed no significant difference between the two groups studied. Norepinephrine decreased renal plasma flow in normotensives more than in hypertensives in absolute values as well as percentage change. In view of the greater decrease in renal plasma flow in normotensives, as would be expected, norepinephrine induced a greater increase in renal resistance in normotensive subjects than in hypertensive patients. This fact was further corroborated by the relatively greater increase in filtration fraction in normotensive subjects. A further indication of the relatively greater reactivity of the renal arterioles in normotensive subjects compared to hypertensive patients is the fact that during the maximal dose of norepinephrine the per cent increase in renal resistance was greater in the normotensive subjects.

These observations were repeated in normotensive and hypertensive individuals after prolonged salt deprivation. The extent of norepinephrine-induced systemic vasoconstriction was unaltered by salt restriction in both groups, and renal plasma flow was decreased and renal resistance increased to the same extent in both normotensive subjects and hypertensive patients.

Our data do not support the view that the vasoconstrictive effect of infused L-norepinephrine on either systemic or renal arterioles is greater in hypertensive patients than in normotensive subjects.

Cardiotonic Nucleosides (Abstract)*

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The effects of certain naturally occurring nucleosides on acute left ventricular failure was studied in 15 isolated dog hearts. Using a preparation in which only the left ventricle performed external work, unilateral failure was produced by exposure of the ventricle to elevated aortic pressure. Parameters of left ventricular function used to evaluate the control, failure and nucleoside periods included stroke work and contractility. Administration of the nucleosides (available to the myocardium in concentrations of 4×10^{-5} molar) was accompanied by reproducible effects on the ventricle after failure.

Adenosine and cytidine were found to further decrease stroke work and contractility. Guanosine, inosine, thymidine and uridine were found to restore or exceed the control level of work and contractility. On the basis of separate metabolic studies with dog blood, it was concluded that only limited degradation of the nucleosides by blood enzymes could have occurred. The effects on the ventricle were shown to be independent of heart rate, chamber size and coronary supply. The compounds apparently could be classified as positive or negative inotropes according to the substituent groups on the 6-carbon of the pyrimidine ring. Further work on this relationship of structure and function is in progress.

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An Experimental Procedure for Correction of Transposition of the Great Vessels (Abstract)*

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There is no standard procedure for the correction of transposition of the great vessels. The need for such a procedure is clear from the fact that this defect is the largest cause of infant mortality from congenital heart disease. Venous transposition should offer the most likely possibility of successful correction of this condition because of the great technical difficulty in transposing the associated coronary arteries. A procedure producing total intracardiac venous transposition has been devised, and demonstrated in dogs to accomplish this end. The operation is done under conditions of cardiopulmonary bypass with potassium

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citrate arrest. The entire intra-atrial septum is excised converting the two atria into one large chamber. An artificial septum of crimped and knitted dacron is placed so as to exclude the entire pulmonary venous drainage and the tricuspid orifice from the remaining common chamber. This results in flow of the systemic venous blood into the left ventricle through the atrial defect and mitral valve; the entire pulmonary venous drainage is shunted directly into the right ventricle through the tricuspid orifice. Mixing is prevented by the artificial septum. The intracardiac manipulations have averaged 35 minutes of cardiopulmonary bypass. Studies by angiogram and oxygen saturation have demonstrated the venous transposition.

The procedure as described has been applied to a clinical case unsuccessfully, death having resulted from a technical error in the use of the pump oxygenator, resulting in fatal over-transfusion. The procedure itself, however, proved to be perfectly feasible, and seemed to be technically satisfactory at autopsy.

The Effect of Synthetic Vasopressins on Adrenal Cortical Secretion (Abstract)*

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Adrenocortical steroid output, as influenced by synthetic vasopressins, was determined by the method of Hilton and associates (*Amer. J. Physiol. 192:*525, 1958), employing an aortic pouch perfusion.

Both synthetic arginine and synthetic lysine vasopressin were shown to have a stimulatory effect on the adrenal cortex comparable to that achieved with ACTH in the hypophysectomized dog adrenal preparation perfused with hypophysectomized donor blood. In 15 experiments hydrocortisone secretion from the perfused adrenal glands during control periods averaged less than 1γ per minute. Following stimulation with vasopressin (0.1 - 0.4 units per minute for 7 minutes) a six-fold rise in secretion rate was noted. This was associated with a blood pressure rise within the pouch averaging 25 mm.Hg. A similar pressor response evoked by norepinephrine had no effect on steroid secretion. In several experiments the stimulation achieved by vasopressin equalled or exceeded that of a maximal ACTH dose (1 unit per minute for 7 minutes).

It is concluded that vasopressin has a marked adrenocortical stimulatory effect and may play an important role in the stress reaction.

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Intermittent Positive Pressure Breathing in Patients with Pulmonary Heart Disease: Its Effect on Distribution of Inspired Air (Abstract)*

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One of the primary considerations in the treatment of pulmonary heart disease is directed at the improvement of the ventilation of the lung. Intermittent positive pressure breathing is a modern and frequent measure used for this purpose. Although reports have been made of its effectiveness or noneffectiveness, no reports have been made of its mode of action nor have studies of ventilation been made during its actual administration.

The measurement of the effect of intermittent positive pressure breathing on the distribution of the inspired air, and the number and types of ventilatory spaces in patients with pulmonary emphysema and pulmonary heart disease were made before and during the actual administration of intermittent positive pressure breathing.

Twelve patients and ten control subjects were studied both before and during intermittent positive pressure breathing. The functional residual capacity, continuous nitrogen washout curves with 100 per cent oxygen breathing by means of a nitrogen analyzer were made. The size and number of the ventilatory spaces were calculated and plotted and the Fowler index was measured.

The data obtained showed that in the patients with pulmonary heart disease there was over 100 per cent increase in functional residual capacity, four to six spaces of ventilation, with the poorly ventilated spaces comprising usually above 50 per cent of the whole. During intermittent positive pressure there was a decrease in size and number of ventilated spaces to as few as three in some cases, with the P.V.S. being significantly reduced and the Fowler index being markedly reduced and approaching the normal. Concomitant elevation of arterial oxygen tensions and decrease in arterial carbon dioxide tension occurred.

It may be concluded from this study that intermittent positive pressure breathing given to the patient with pulmonary heart disease improves the distribution of inspired air, decreases or abolishes the poorly ventilated spaces and thus improves alveolar ventilation.

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The Mimetic Nature of Rheumatic Fever Recurrences (Abstract)*

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Valvular involvement—manifested by diastolic and/or apical unequivocally-organic systolic murmurs—has been shown to have important prognostic significance in acute rheumatic fever. Patients without valvulitis remained free of heart disease. Recurrences of rheumatic fever are considered dangerous because they may increase cardiac damage or may bring it to patients who did not acquire it with the first attack.

The latter concept has now been re-examined. The present work demonstrates that recurrent attacks of rheumatic fever frequently have mimetic and repetitive patterns in the same individual, consistent with the following hypotheses:

1. Patients who do not have valvular involvement in the first attack do not get it with subsequent attacks.
2. Patients who eventually have rheumatic heart disease show evidence of valvulitis in their *first* attack. In these individuals, recurrences are particularly to be feared because the cardiac damage may recrudesce or increase.

The data to support these hypotheses come from an analysis of the rheumatic episodes in 161 patients who had two or more attacks. Each of the 370 attacks fulfilled the modified Jones' diagnostic criteria. Each patient had been treated at Irvington House during the most recent attack and had been followed monthly thereafter on anti-streptococcal prophylaxis. Although arthritis, chorea and/or erythema marginatum showed individual recurrent patterns, these noncardiac features will not be further discussed here.

The analysis of valvular involvement showed the following: 61 patients conformed to hypothesis 1) above. Despite multiple rheumatic attacks, they remained free of heart disease. Ninety patients conformed to hypothesis 2). In each instance, evidence of valvular involvement appeared with the *first* attack. Recurrent attacks in this group brought a recrudescence of valvulitis, worsening of the cardiac status, or evidence of new valvular damage. Ten patients failed to conform to hypothesis 1) or 2), and showed a diastolic murmur during a later attack although none was recorded at the first attack. In eight of these patients, however, the data clearly indicated the likelihood that the diastolic murmur was present at the first attack but had not been recognized. The remaining two patients were the only significant exceptions to the stated hypotheses.

These results suggest that patients have an inherent and persistent susceptibility which predetermines the tissues involved in rheumatic inflammation. There are also evident clinical implications for the selection of rheumatic patients for continuous and indefinite antistreptococcal prophylaxis.

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